LAUDA

Operating Instructions

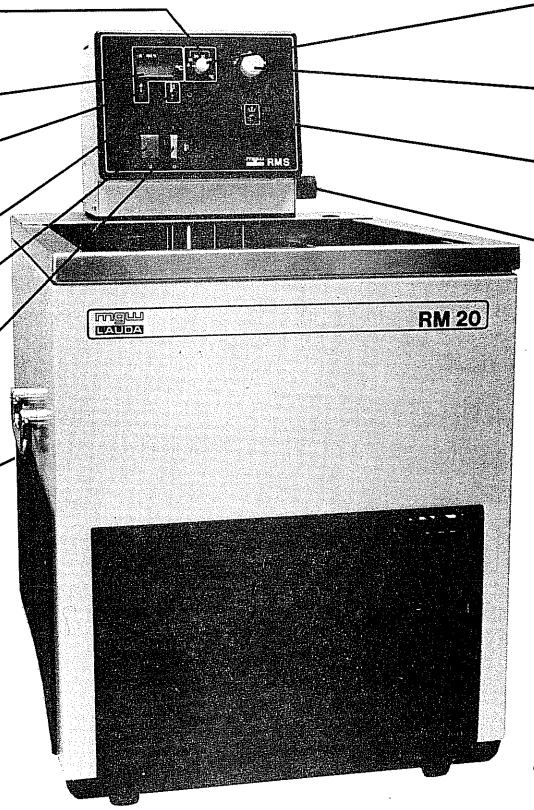
LAUDA Compact
Low-temperature Thermostats
RMS 6, RMS 6-DS, RMS 20 and RMS 25
to DIN 12 879

YACE0001
From series D 50
05/89

LAUDA DR. R. WOBSER GMBH & CO. KG
Postfach 12 51, D-97912 Lauda-Königshofen
Tel. (0 93 43) 503 - 0, Fax (0 93 43) 50 32 22
E-mail info@lauda.de, Internet http://www.lauda.de

Compact-Kältethermostate, Reihe RMS
Thermostats compacts de réfrigération, Série RMS
Compact-Low-Temperature Thermostats, Series RMS

LAUDA



Justierpotentiometer
Potentiomètre d'ajustage
Balancing potentiometer

LCD-Anzeige
Indication LCD
LCD-Display

Ist-Sollwert Taster
Touche Valleur réelle
Valeur de consigne
Key Actual value – Set point

Kontrolleuchte „Heizung"
Lampe témoin "Chauffage"
Pilot lamp "Heater"

Netzschalter
Interrupteur général
Mains switch

Schalter „Kühlung"
Touche "Refroidissement"
Key "Cooling"

Entleerungshahn
(rückseitig)
Robinet de vidange
(à l'arrière)
Drain cock (rear)

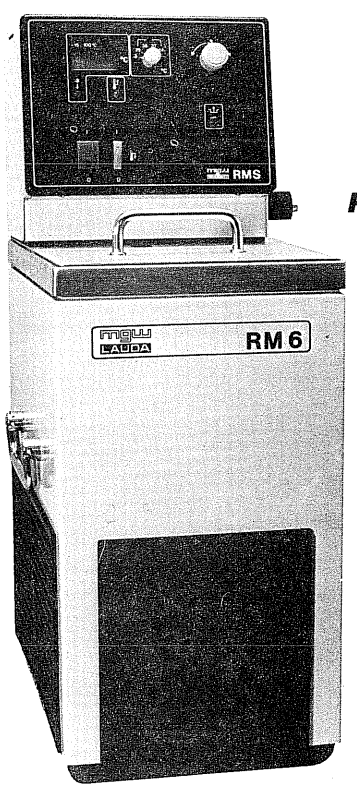
Festtemperaturen
Températures fixes
Fixed temperatures

Temperatureinstellung
Ajustage de température
Temperature adjustment

„Entsperren"
"Déblocage"
"Release"

Pumpenstutzen
Tubulures de pompe
Pump nozzles

RMS 20



RMS 6

LAUDA DR. R. WOBSER GMBH & CO. KG
Postfach 1251, D-6970 Lauda-Königshofen
Tel. (09343) 503-0, Tx. 689523, Fax (09343) 503222

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Enclosures

Accessories

Spares

Circuit diagram

Summary of LAUDA Heating Thermostats and LAUDA Low-temperature thermostats

1. Brief operating instructions

- Check thermostat and accessories during unpacking for possible transport damage and, if necessary, notify carrier or post office.

- Assemble unit according to Section 6 and add items as appropriate.

- Connect the tubing at the pump connectors:

  Without external circulation: Link together the pump connectors with the insulated silicone tubing supplied.

  With external circulation: Connect tubing to the external system. Secure tubing with clips to prevent it slipping off.

- Use decalcified water only (above 5°C) or water-glycol mixture (below 5°C) (See section 5). Fill the unit up to approx. 2 cm below the top plate.

- Check the supply voltage against the data on the rating label. Connect the cable to the supply.

- Operation without refrigeration unit (temperature above 30°C)
  mains switch (green) I (ON) (green lamp lights up)
  switch "cooling" 0 (OFF)

- Operation with refrigeration unit (temperature below 30°C)
  mains switch (green) I (ON)
  switch "cooling" I (ON)

- When operating with an external system ensure that the level inside the thermostat does not drop too much when the external system is being filled with the bath liquid.

- The digital thermometer shows the actual bath temperature.

- To set the temperature press the button , this changes the digital display from bath temperature to setpoint. Now select the desired temperature by turning the knob . For this operation the selector switch has to be set on . When operating with a fixed temperature (25, 35, 37 or 56°C) set the selector switch to this value. If necessary adjust with a small screwdriver.

- When the bath liquid has reached the set temperature, the yellow pilot lamp "heating" begins to flash. After the temperature has settled down, the digital thermometer indicates the selected bath temperature.

- Safety The thermostat is a Class 1 W unit. It must only be operated with non-inflammable liquids (see also Section 5).

- Important note Parts of the bath cover may heat up to 60°C or more at higher operating temperatures. The outflow and return tubes of the pump reach the bath temperature.

2. Table of Data

These thermostats meet the requirements of DIN 12 879.

Type		RMS 6	RMS 6-DS	RMS 20	RMS 25
Temperature range	(°C)	-15 ... 100			
Temperature setting		digital, using 10-turn potentiometer and numerical indication; resolution of indication 0.1°C, potentiometer approx. 0.03°C.			
Fixed temperatures	(°C)	25, 35, 37, 56			
Indicating thermometer		built-in digital thermometer, 0.1°C resolution, absolute accuracy better than 0.3% of range.			
Temperature probe/ control action		Pt 500 platinum resistance thermometer/PID			
Temperature control (at -10°C)	(°C)	+/-0.01		+/-0.02	
Heating load	(kW)	automatic adjustment as required 0 ... 1			
Cooling rating eff.					
20°C	(kW)	0.2		0.23	0.25
0°C		0.14		0.15	0.2
-10°C		0.08		0.10	0.16
-15°C		0.05		0.06	0.13
Class to DIN 12 879		Class 1 W (with R 35 and TS 35 - 200: Class 3)			
Flow rate					
Pressure/Suction (against zero head)	(l/min)	8/-	8/5	8/-	8/-
Discharge					
Pressure/Suction	(bar)	0.15/-	0.17/0.15	0.15/-	0.15/-
Capacity	(l)	4 - 6		14 - 20	19 -25
Bath liquid					
5 to 100°C		decalcified water			
-30 to 100°C		water-monoethylene glycol mixture 1:1			
Dimensions					
Bath opening (WxD)	(mm)	150x130		300x350	300x350
Depth of bath	(mm)	160		160	200
Usable liquid depth	(mm)	140	140	140	180

Type		RMS 6	RMS 6-DS	RMS 20	RMS 25
Overall dimensions (W x D x H)	(mm)	200x350x 575		350x540x 630	350x540x 670
Weight	(kg)	24	24	34	36
Power supply	(V/Hz)	220 - 240 V / 50 Hz , 230 V; 60 Hz Protection Class 1 to VDE 0100			
	(kW)	1.3	1.3	1.3	1.4
Interference suppression		according to VDE 0875			
Ref.No.					
220-240 V, 50 Hz		LCK 111	LCK 137	LCK 113	LCK 127
230V, 60 Hz		LCK 211	LCK 237	LCK 213	LCK 227

3. Basic construction

These operating instructions apply to 4 Compact Low-temperature thermostats of different construction, Series RMS:

Compact Low-temperature thermostat RMS 6

Compact bath/circulation thermostat with large bath opening for thermostating inside the bath.

Compact Low-temperature thermostat RMS 6-DS

Compact bath/circulation thermostat with a combined pressure-suction pump for thermostating open and closed external systems.

Compact Low-temperature thermostat RMS 20

Bath/circulation thermostats with large bath opening for thermostating of large items or a large number of items inside the bath.

Compact Low-temperature thermostat RMS 25

Bath/circulation thermostat with large bath opening and a bath depth of 200 mm (RMS 20: 160 mm).

The common feature of all four models is the thermostat unit RMS containing the electronics as well as the circulation pump, together with the appropriate cooling systems. Within the range where heat has to be removed from the bath, the temperature control operates by running the refrigeration unit continuously while the heater maintains the bath temperature at the required setting through controlled heating pulses using a solid-state proportional PID controller with a packet switching triac relay.

Built-in digital thermometer with 0.1°C resolution and digital temperature setting using 10-turn potentiometer and numerical indication. Adjustable range and 4 fixed temperature settings. The Data table (see Section 2) contains the main technical data of the thermostats.

If the heater overheats through loss of liquid, a temperature limiter switches off heater, pump, electronics and refrigeration unit on all poles.

Warning: The heater surface may reach temperatures up to 250°C, especially with complete loss of liquid!

4. Safety system

4.1 The DIN specification 12 879 for laboratory thermostats entitled "Liquid Thermostats, General and Safety Requirements" has been in operation since 1 May 1979. This specification lays down the safety devices required and divides thermostats into different safety classes.

4.2 Why can it be dangerous to operate a thermostat?

1. Thermostats are fitted with heaters which provide the necessary heating energy for the thermostatic liquid. If the temperature control fails, or if the liquid level is too low, the heater may reach a temperature which in combination with inflammable thermostatic liquids can cause a fire in the laboratory.

2. When using the thermostat with external circulation, failure of the tubing can cause discharge of hot liquid and endanger persons and material.

The classification of thermostats depends on:

- o whether non-inflammable or inflammable thermostatic liquids are used;
- o whether the thermostat is operated under supervision or unsupervised.

4.3 The units Series RMS as described in these Operating Instructions are to Class 1 W. They are only suitable for

- o non-inflammable bath liquids, i.e. preferably water; and the non-inflammable water-monoethylene glycol mixture (see Section 5).

Important note

Even with Class 1 W the user is only protected against hazards resulting from excess temperature and low level.

Other hazards may arise from the type of products being thermostated, e.g. a shift above or below certain temperature levels or breaking of the container followed by reaction with the thermostatic liquid etc. It is impossible to provide protection against all possible cases and they remain largely within the decision and responsibility of the user.

5. Bath liquids and tubing

According to Section 4, only non-inflammable liquids may be used.

The operating ranges of the bath liquids and tubing represent general data which may be limited by the operating temperature range of the unit.

5.1 Bath liquids

Operating range 5 ... 100°C

Use decalcified water only. Remember to make up losses through evaporation at elevated temperatures. Losses can be reduced by using suitable bath covers (see Accessories).

Operating range -30 ... 100°C

Use water-monoethylene glycol mixture, preferably Glycoshell P 300, in the ratio 1:1.

Operating range	-30 ... 100°C	Ultra-Therm G 100
Boiling point	110°C	
Viscosity at 20°C	4 mm^2/sec	Ref.No. LZB 009
Non-inflammable		

Prolonged operation at elevated temperatures results in a decreasing proportion of water in the mixture which gradually approaches the properties of pure glycol and thus becomes inflammable (flashpoint 128°C). The mixture ratio must therefore be checked from time to time, i.e. against the original mixture, or with a hydrometer.

5.2 Tubing (continuous lengths)

	Ref.No.
Perbunan tubing, uninsulated 9 mm int. dia. Application range 0 ... 100°C For water and water-glycol mixtures.	RKJ 011
Silicone tubing, uninsulated 8 mm int. dia. Application range -30 ... 120°C. For water and water-glycol mixtures.	RKJ 016
Silicone tubing, insulated 8 mm int. dia. With foam rubber insulation. External dia. approx. 30 mm. Use as for uninsulated silicone tubing.	LZS 001
Silicone tubing, uninsulated 4 mm int. dia. Use as for silicone tubing 8 mm int.dia.	RKJ 041
Pump reducing fitting for tubing 4 mm int. dia.	HKO 018

Secure tubing with clips to prevent it slipping off.

6. Unpacking, assembly and setting up

6.1 The units are packed carefully to prevent transport damage. If, however, the unit should arrive damaged, the carrier or the railway authorities have to be be informed so that it can be inspected.

Standard accessories

1 m Silicone tubing, insulated, 8 mm int.dia.
1 Bath cover (RMS 6 only)
Operating Instructions

6.2 Assembly and setting up

The units are set up to suit the application. Ensure that the ventilation openings to the refrigeration unit are not obstructed.

If no external circulation is required the pump connectors must be linked together with the silicone tubing supplied. First the yellow cap must be removed; it is only intended to prevent the thermostat contents being pumped out unintentionally and is not suitable as a permanent closure. Outflow tube always at the front, return tube or suction tube at the back. When connecting up an external system proceed according to Section 7.

7. Connecting external systems

For operation above 10°C use uninsulated perbunan tubing (Ref.No RKJ 011); for operation below 10°C the insulated silicone tubing (Ref.No. LZS 001) is recommended. When operating with photometers, refractometers, etc. which have connectors for 4 mm int. dia. tubing, the reducing fittings (Ref.No. HKO 018) are screwed onto the connectors. Suitable silicone tubing is Ref.No RKJ 041. An adequate flow rate is required to ensure reliable thermostating of the external apparatus. Where the flow cross section is severely restricted there may be a temperature drop between bath and external system due to the low flow rate. In that case the bath temperature has to be suitably increased or decreased.

When starting up the thermostat ensure that the liquid level does not drop too much. Top up with liquid until the correct level is reached.

Secure the tubing with clips to prevent it slipping off.

The units RMS 6-DS are fitted with a combined pressure-suction pump. The powerful circulating pump permits the thermostating of closed external systems at higher pump rates, and in particular the thermostating of open external systems.
There are two possibilities for maintaining a constant level when connecting open systems:

1. The suction pipe in the external bath has to be fastened in such a way that its end is positioned at the required liquid level. When reducing the pump capacity of the pressure stage by using a pipe clamp at the connection pressure nozzle-external bath, the flow rate of the pressure stage will drop slightly below the flow rate of the suction stage. That can be noticed when the suction pipe sucks in air.

2. A better and more professional solution is the application of a LAUDA Level Controller (LPZ 901) which provides level control with float, screw nozzle for external bath and possiblility for manual ventilation.

Note: When thermostat and external bath are not set up at the same level the connecting pipes must be ventilated in order to prevent the bath to overflow when the pump is switched off.

8. Starting up

Before starting up allow the unit to stand for at least half an hour in its normal operating position so that any oil which may have run out of the compressor during transport can flow back.

8.1 Filling

Fill the unit with decalcified water or water-glycol mixture according to Section 5. The capacity is indicated in Section 2 (Table of Data). Generally the thermostats should never be filled higher than 2 cm below the cover.

While the thermostat is in use the heater and the evaporator coil of the refrigerator must always be covered with liquid! When it is connected up to an external system, check during starting up that the liquid level in the thermostat does not drop too low due to filling up the external system. If necessary, top up with liquid until the correct level is reached.

The Low-temperature thermostats RMS 20 and RMS 25 can be covered with a flat bath cover (see Accessories) or with a gable cover even when there is glassware or other items in the bath. This is advisable especially at higher temperatures.

8.2 Connect the unit only to a grounded socket. Check the details on the rating label against the supply voltage.

8.3 Ensure that the pump connectors are linked together when there is no external system.

8.4 Operation **without** refrigeration unit (temperatures above 30°C)

mains switch (green)	I (ON) (green lamp lights up)
switch "cooling"	0 (OFF)

The digital display indicates the actual bath temperature. Set selector switch to and fixed temperatures (24, 35, 37 and 56°C) to . Press key , the setpoint now appears on the digital display. Select the desired temperature by turning the knob (10-turn potentiometer). Then release the key, and the display shows the actual bath temperature again.
The fixed temperatures can be selected directly irrespective of the setting of rotary knob . The fixed temperatures can be readjusted by inserting a small screwdriver into the opening above the selector switch. Pressing the key also displays the fixed temperatures.
When the set temperature has been reached the yellow pilot lamp "heating" begins to flash. After the unit has settled down the digital thermometer indicates the selected temperature.

When changing rapidly from a high to a low temperature the refrigeration unit can also be switched on in the heating range.

8.5 Operation **with** refrigeration unit (temperature below 30°C)

mains switch (green)	I (ON) (green lamp lights up)
switch "cooling"	I (ON) (yellow lamp lights up)

The thermostat is switched off with the mains switch.
The switch "cooling" can remain on.

9. Cooling circuit

9.1 Construction

The refrigeration unit consists essentially of a hermetically sealed compressor. Heat of condensation and motor heat are dissipated through a finned condenser with fan cooling. The fresh air is drawn in at the front of the unit, heated and discharged to the back and to the side. In order to ensure effective air circulation the ventilation openings must not be obstructed. The cooling circuit is shown schematically on page 10.

At temperatures below 30°C the refrigeration unit runs continuously to remove a certain amount of heat from the bath, while the heater operates against this with an output which is automatically adjusted by the control system. The compressor runs virtually noiselessly and vibration-free. It is charged with a special oil and requires no maintenance. The refrigerant used is Freon 12 (R 12).

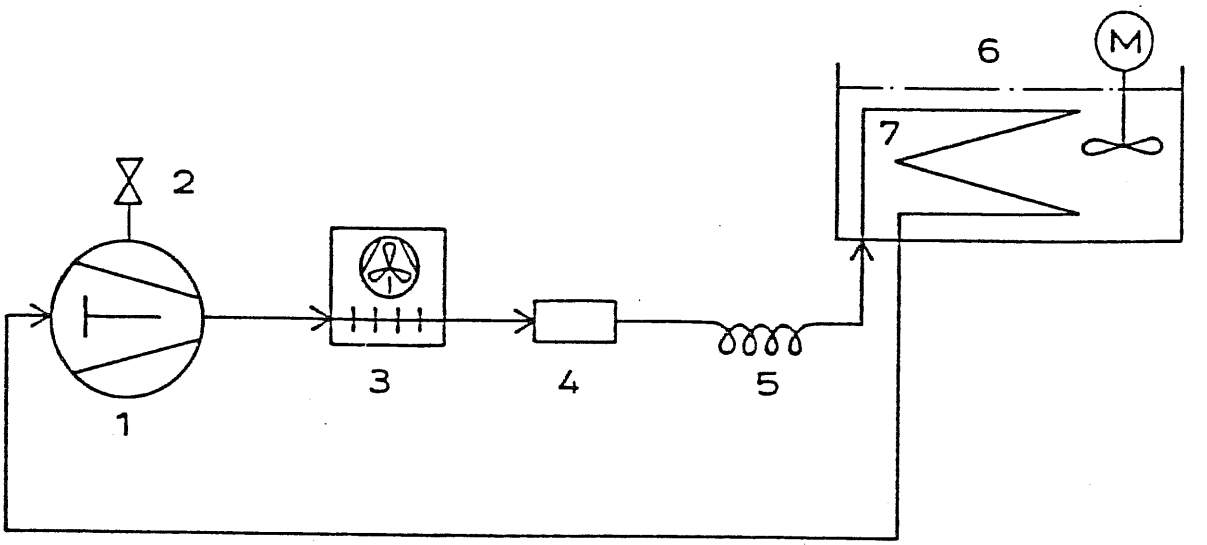
9.2 Maintenance

The refrigeration unit operates to a large extent without maintenance. If the unit operates under dusty conditions we recommend that the refrigerator condenser is cleaned every 4 to 6 months. This is done best with compressed air or nitrogen which is blown into the ventilation openings for a few minutes. If necessary unscrew the ventilation grill.

9.3 Overloading the refrigeration unit

The driving motor of the compressor is protected against overload by a double-action bimetal switch (KLIXON). The overload switch responds both to the capsule temperature and to the current taken by the compressor motor. With insufficient ventilation the housing temperature rises and with it the condensation pressure. Both effects lead to overload on the driving motor and cause the thermostat to be switched off. The unit switches on again automatically as soon as the compressor housing has cooled down.
The refrigeration unit can of course also be used at higher temperatures to produce rapid cooling. The KLIXON cut-out may switch the compressor on and off several times.

Schema Kältekreislauf/Schéma circuit de réfrigération/Diagram cooling circuit



Nr.	Teil/Pièce/Part
1	Kompressor/Compresseur/Compressor
2	Füllventil/Vanne de remplissage/Feed valve
3	Kondensator/Condensateur/Condenser
4	Trockner/Secheur/Drier
5	Kapillarrohr/Tube capillaire/Capillary tube
6	Verdampferschlange/Evaporateur à serpentins/Evaporator coil
7	Flüssigkeitsbad Thermostat/Bain pour liquide du thermostat/ Liquid bath Thermostat

10. Operation of the safety circuit

10.1 The following three faults could occur:

- o The thermostat is started up without bath liquid or with the liquid level too low (heater partly uncovered).
- o The liquid level drops too much during operation, especially at high temperatures. The same fault may be caused by failure of the tubing and liquid being pumped out of the thermostat.
- o Failure of the control system, resulting in continuous heating. The liquid eventually reaches the boiling point and evaporates.

If any of the above faults occur, the safety circuit comes into operation. A built-in temperature probe measures the surface temperature of the heater and switches off the thermostat if a certain limiting temperature is exceeded. According to DIN 12 879 this type of protection is called over-temperature protection. Since the heater surface can reach very high temperatures, up to 250°C, especially when the thermostat runs completely dry, only water or water-glycol mixture may be used in the thermostat; otherwise it is impossible to prevent a fire under all circumstances despite the use of a safety system.

10.2 Operation of the safety circuit switches off the thermostat on all poles (heater, pump, electronics and refrigeration unit); the reset button "Release" ⏏ jumps out approx. 3 mm. Additionally the release of the safety circuit can be recognized when the LED-Display is out of action while the unit is switched on (green lamp lightened). The thermostat can only be restarted after

- o the temperature probe on the heater has cooled down to below 60°C.
- o the fault has been corrected (liquid level too low, faulty control circuit, burst tubing).
- o the reset button has been pushed in (press hard!).

This ensures that the thermostat cannot start up again automatically, for example through a reduction in the temperature which could suggest that the fault has been rectified.

11. Maintenance

LAUDA thermostats are designed for continuous operation. They require no regular maintenance. Contaminated bath liquid should be drained out through the drain cock and replaced with fresh liquid. If the unit should become defective it is recommended that the thermostat unit is removed and returned to the works. Pull out the mains plug and remove the cover.

If you should have any questions concerning technical problems, the order of spare parts or the order of additional service material please add type designation **and** serial number.

We shall always be happy to deal with queries, suggestions and complaints.

LAUDA DR. R. WOBSER
GMBH & CO. KG
Postbox 1251
6970 Lauda-Königshofen

West Germany

Phone: 09343/503-0
Telex: 689 523 lauwo d
Fax: 09343/503-222

Accessories for Compact Low-temperature Thermostats

Type		Ref.No.
Reference thermometers		
0/70°C	graduation 0.5°C	ET 030
0/100°C	graduation 0.5°C	ET 031
-30/100°C	graduation 0.5°C	ET 032
Reference thermometer case		HKF 036
Stainless steel racks for RM 20 for test tubes, centrifuge tubes, etc. Bath RM 20, up to 4 racks		
RD 13	for 56 tubes 10 - 13 dia., 80 mm immersion	UG 066
RD 18/1	for 33 tubes 14 - 18 dia., 80 mm immersion	UG 067
RD 18/2	for 33 tubes 14 - 18 dia., 110 mm immersion	UG 068
RD 30	for 14 tubes 24 - 30 dia., 110 mm immersion	UG 069
Stainless steel racks for RM 25 for test tubes, centrifuge tubes, etc. Bath RM 25, up to 4 racks		
RE 13	same as RD 13	UG 070
RE 18/1	same as RD 18/1	UG 071
RE 18/2	same as RD 18/2	UG 072
RE 30	same as RD 30	UG 073
Bath cover (flat), stainless steel, for Types RM 20 and RM 25 2 parts		LCZ 009
Rising platform to be mounted subsequently on RM 20 and RM 25 Bench area 250 x 160 mm, height continuously adjustable RM 20: max. 2 platforms		LCZ 012
Gable cover, stainless steel, for Types RM 20 and RM 25		LCZ 011
Stainless steel racks for RM 6		
RF 18/1	for 20 tubes 14 - 18 dia., 80 mm immersion	UG 074
RF 18/2	for 20 tubes 14 - 18 dia., 100 mm immersion	UG 075
Level controller, (RMS 6-DS only) for the thermostating of open external systems		LPZ 901
Tubing (continuous lengths)		
Silicone tubing,	8 mm int. dia.	RKJ 016
Silicone tubing,	4 mm int. dia.	RKJ 041
Silicone tubing,	insulated, 8 mm int. dia.	LZS 001
Perbunan tubing,	9 mm int. dia.	RKJ 011
Reducing fitting for pump, for tubing 4 mm int. dia.		HKO 018

Compact Low-temperature Thermostats Series RM

Special racks for Type RM 6, Makrolon

Type	Description	Ref.No
Boehringer Mannheim Monotest	8 Monotest 2 Monotest 10 6 square cells	UE 001
Geigy	8 Centrifuge or conical tubes, 100 x 16/17 mm 16 Uhlenhut tubes, 100 x 9 x 10 mm	UE 021
Test tubes, 160 mm	20 test tubes 160 x 16/17 mm	UE 020
Test tubes, 100 mm	20 test tubes or centrifuge tubes 100 x 16/17 mm	UE 022
Haemolysis tubes	13 int.dia. (30 tubes)	UE 023
Eppendorf tubes (up to 1)	74 tubes	UG 085
Cuvette test Dr.B. Lange		UE 005

UNIPROTECT R 35 — LRS 002

Universal over-temperature and low-level protection.
Retrofitting with R 35 provides every thermostat with protection to Class 3 DIN 12 879.
Accessories required: immersion probe TS 35-200 and special holder.

Immersion probe TS 35-200 — US 014

Fixing bow for TS 35-200 — UD 049

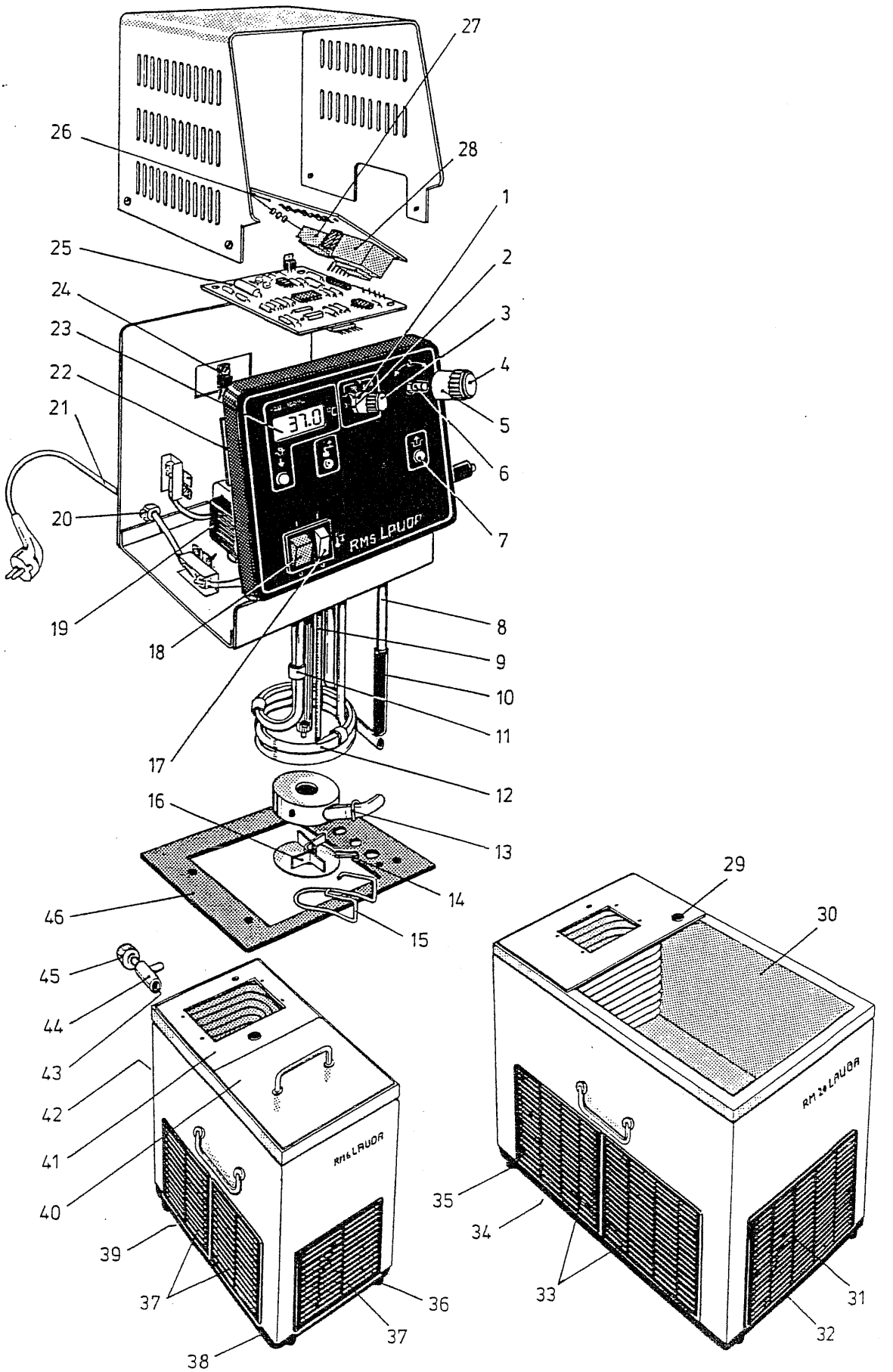
Ersatzteile / Pièces détachées / Spare parts
RMS 6, RMS 6-DS, RMS 20, RMS 25

Bestellnummer/N° de reference/Reference number

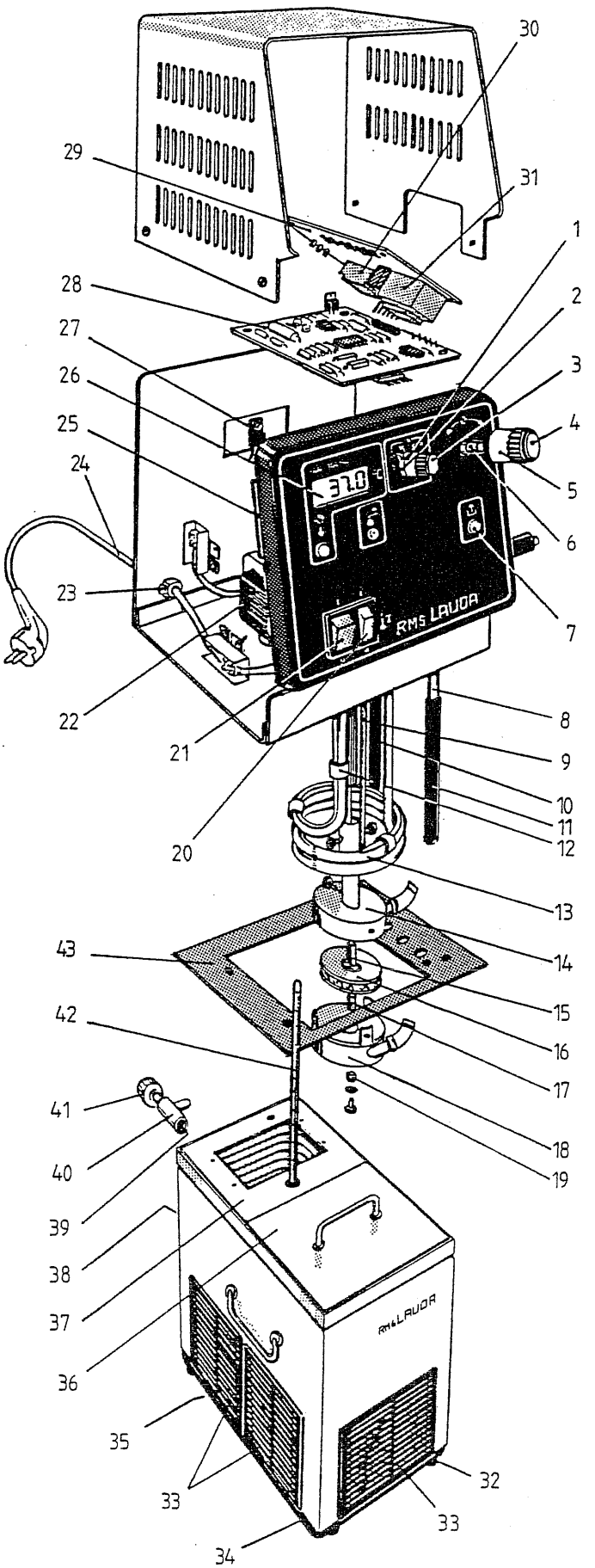
1	Drehknopf/Bouton rotatif/Rotary knob	EZD	046
2	Zeiger/Aiguille/Pointer	EZD	048
3	Kappe/Calotte/Cap	EZD	047
4	Kappe/Calotte/Cover	EZD	051
5	Drehknopf/Bouton rotatif/Rotary knob	EZD	050
6	Potentiometer/Potentiomètre/Potentiometer 1 kOhm	EWD	042
7	Temperaturbegrenzer/Limiteur de température/Temperature limiter	US	026
8	Druck- und Rücklaufstrutzen/Tubulures de refoulement et de retour/Outflow-Return tubes	UO	040
9	Temperatur-Fühler Pt 100/Sonde de température Pt 100/Temperature probe Pt 100	ETP	021
10	Perbunanschlauch/Tuyau Perbunan/Perbunan tubing	HOF	005
11	Klemme/Pince/Clamp	HIB	012
12	Heizkörper/Corps de chauffe/Heater 220-240 V, 50-60 Hz	UH	089
13	Feder/Ressort/Spring	HI	012
14	Splint/Goupille/Splint pin	DIS	003
15	Spange/Agrafe/Clip	HI	014
16	Rührpropeller/Hélice/Stirrer	HX	102
17	Schalter/Interrupteur/Switch	EST	056
18	Netzschalter/Interrupteur secteur/Mains switch	EST	032
19	Motor/Moteur/Motor 220-240 V	EM	039
20	Zugentlastung/Protection pour câble/Cable tension relief	EKZ	009
21	Netzkabel mit Schukostecker/Câble secteur avec fiche à contact de protection/ Mains cable with earthed plug	EKN	009
22	Leiterplatte "A/D-Wandler"/Circuit imprimé "A/D-Convertisseur"/Printed circuit board "A/D-Converter"	UL	200
23	Leiterplatte "LED-Anzeige"/Circuit imprimé "Indication LED"/Printed circuit board "LED-Display"	UL	194
24	Triac/Triac/Triac	EYY	008
25	Leiterplatte "Regelung"/Circuit imprimé "Régulation"/Printed circuit board "Control"	UL	201/229*
26	Leiterplatte "Netz"/Circuit imprimé "Secteur"/Printed circuit board "Mains" 220 V	UL	199/230*
27	Zündübertrager/Translateur d'allumage/Ignition transducer BV 282 - 1 - 00054	EIZ	005
28	Transformator/Transformateur/Transformer BV 178 - HO 1	EIT	068
29	Blindtülle/Douille d'obturation/Rubber piece	EZV	016
30	Temperiereinheit kompl. (Innenkessel, Badbrücke, Verdampfer, Kapillare und Isolierung/ Unité de thermostatisation compl. (Cuve interieure, Pont du bain, Evaporateur, Capillaire et Isolation)/ Thermostatic unit compl. (Inner vessel, Bath bridge, Evaporator, Capillary and Insulation) RM 25	UU	051
	RM 20	UU	043
31	Gitter/Grille/Grill	HGW	133
32	Bodenwanne/Fond de la cuve/Bath bottom	HGB	154
33	Gitter/Grille/Grill	HGW	132
34	Kälteaggregat/Groupe frioriflque/Refrigeration unit RM 25	EMK	050
	RM 20	EMK	041
35	Gummifuß/Pied en caoutchouc/Rubber butt	EZG	005
36	Gummifuß/Pied en caoutchouc/Rubber butt	EZG	009
37	Gitter/Grille/Grill	HGW	131
38	Bodenwanne/Fond de la cuve/Bath bottom	HGB	152
39	Kälteaggregat/Groupe frigorifique/Refrigeration unit	EMK	042
40	Baddeckel/Couvercle de bain/Bath cover	HDQ	041
41	Temperiereinheit kompl. (Innenkessel, Badbrücke, Verdampfer, Kapillare und Isolierung/ Unité de thermostatisation compl. (Cuve interieure, Pont du bain, Evaporateur, Capillaire et Isolation)/ Thermostatic unit compl. (Inner vessel, Bath bridge, Evaporator, Capillary and Insulation)	UU	042
42	Gummitülle/Douille en caoutchouc/Rubber piece	EDT	007
43	O-Ring/Joint Torique/O-Ring	EDO	018
44	Entleerungshahn kompl./Robinet de vidange compl./Drain cock compl.	UD	070
45	Drehknopf/Bouton rotatif/Rotary knob	EZD	001
46	Dichtung/Joint/Gasket	EDF	048

* ab Serie/à partir de n° de série/as from serial number D 50

Ersatzteile / Pièces détachées / Spare parts
RMS 6, RMS 6-DS, RMS 20, RMS 25



Ersatzteile / Pièces détachées / Spare parts
RMS 6, RMS 6-DS, RMS 20, RMS 25



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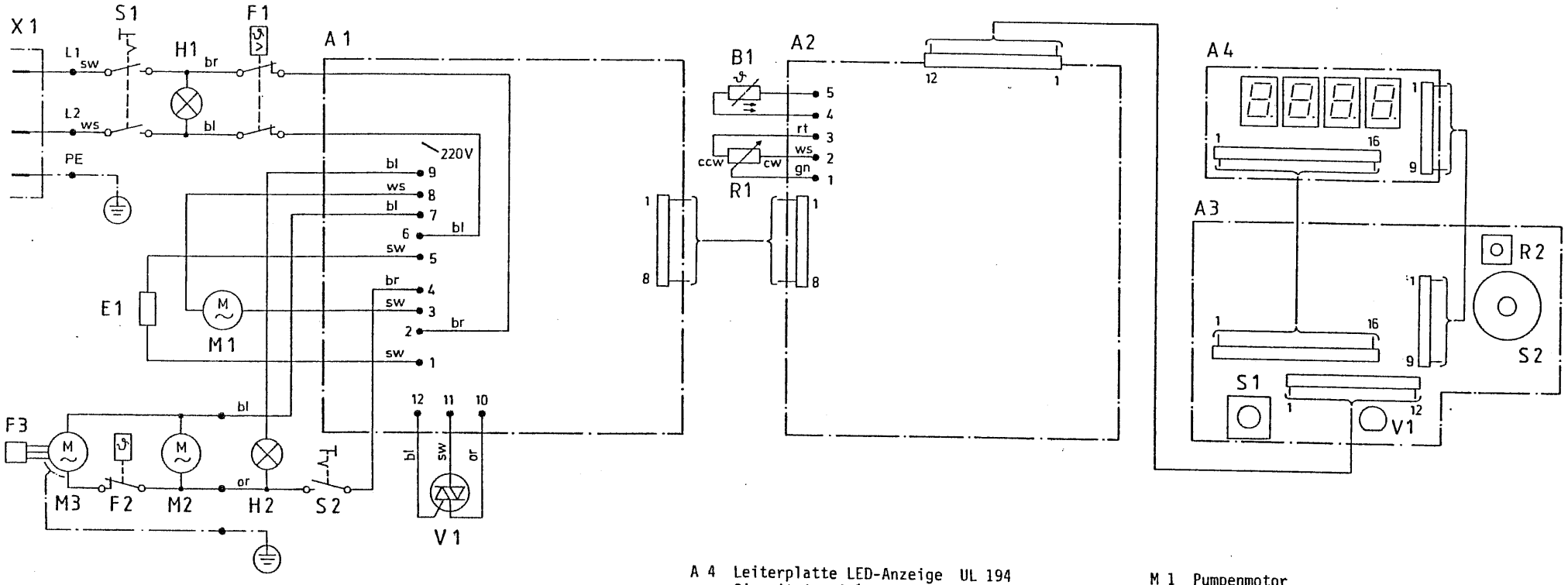
Ersatzteile / Pièces détachées / Spare parts
RMS 6, RMS 6-DS, RMS 20, RMS 25

Bestellnummer/N° de reference/Reference number		RMS 6-DS	
1	Drehknopf/Bouton rotatif/Rotary knob	EZD	046
2	Zeiger/Aiguille/Pointer	EZD	048
3	Kappe/Calotte/Cap	EZD	047
4	Kappe/Calotte/Cover	EZD	051
5	Drehknopf/Bouton rotatif/Rotary knob	EZD	050
6	Potentiometer/Potentiomètre/Potentiometer 1 kOhm	EWD	042
7	Temperaturbegrenzer/Limiteur de température/Temperature limiter	US	026
8	Druck- und Rücklaufstrutzen/Tubulures de refoulement et de retour/Outflow-Return tubes	UO	064
9	Temperatur-Fühler Pt 100/Sonde de température Pt 100/Temperature probe Pt 100	ETP	021
10	Perbunanschlauch/Tuyau Perbunan/Perbunan tubing 130 mm	HOF	012
11	Perbunanschlauch/Tuyau Perbunan/Perbunan tubing 140 mm	HOF	013
12	Klemme/Pince/Clamp	HIB	012
13	Heizkörper/Corps de chauffe/Heater 220-240 V, 50-60 Hz	UH	089
14	Pumpenunterteil kompl./Partie inférieure de la pompe compl./Pump, lower part compl.	UD	152
15	Hülse I/Douille I/Bushing I 9 mm	HO	332
16	Laufrad, Saug kompl./Roue de roulement, aspriation compl./Suction impeller compl.		
	Ausführung/Modèle/Model 50 Hz	HQL	024
	Ausführung/Modèle/Model 60 Hz	HQL	026
17	Hülse II/Douille II/Bushing II 5 mm	HO	333
18	Druckkammer kompl./Chambre de pression compl./Pressure chamber compl.		
	Ausführung/Modèle/Model 50 Hz	UD	153
	Ausführung/Modèle/Model 60 Hz	UD	154
19	Kappe/Calotte/Cap	HKB	318
20	Schalter/Interrupteur/Switch	EST	056
21	Netzschalter/Interrupteur secteur/Mains switch	EST	032
22	Motor/Moteur/Motor 220-240 V, 50-60 Hz		
	Ausführung/Modèle/Model 50 Hz	EM	091
	Ausführung/Modèle/Model 60 Hz	EM	092
23	Zugentlastung/Protection pour câble/Cable tension relief	EKZ	009
24	Netzkabel mit Schukostecker/Câble secteur avec fiche à contact de protection/ Mains cable with earthed plug	EKN	009
25	Leiterplatte "A/D-Wandler"/Circuit imprimé "A/D-Convertisseur"/Printed circuit board "A/D-Converter"	UL	200
26	Leiterplatte "LED-Anzeige"/Circuit imprimé "Indication LED"/Printed circuit board "LED-Display"	UL	194
27	Triac/Triac/Triac	EYY	008
28	Leiterplatte "Regelung"/Circuit imprimé "Régulation"/Printed circuit board "Control"	UL	229
29	Leiterplatte "Netz"/Circuit imprimé "Secteur"/Printed circuit board "Mains" 220 V	UL	230
30	Zündübertrager/Translateur d'allumage/Ignition transducer BV 282 - 1 - 00054	EIZ	005
31	Transformator/Transformateur/Transformer BV 178 - HO 1	EIT	068
32	Gummifuß/Pied en caoutchouc/Rubber butt	EZG	009
33	Gitter/Grille/Grill	HGW	131
34	Bodenwanne/Fond de la cuve/Bath bottom	HGB	152
35	Kälteaggregat/Groupe frigorifique/Refrigeration unit	EMK	042
36	Baddeckel/Couvercle de bain/Bath cover	HDQ	041
37	Temperiereinheit kompl. (Innenkessel, Badbrücke, Verdampfer, Kapillare und Isolierung/ Unité de thermostatisation compl. (Cuve interieure, Pont du bain, Evaporateur, Capillaire et Isolation)/ Thermostatic unit compl. (Inner vessel, Bath bridge, Evaporator, Capillary and Insulation)	UU	042
38	Gummitülle/Douille en caoutchouc/Rubber piece	EDT	007
39	O-Ring/Joint Torique/O-Ring	EDO	018
40	Entleerungshahn kompl./Robinet de vidange compl./Drain cock compl.	UD	070
41	Drehknopf/Bouton rotatif/Rotary knob	EZD	001
42	Kontrollthermometer/Thermomètre de control/Reference thermometer -30/100°C	ET	032
43	Dichtung/Joint/Gasket	EDF	048



A 1 Leiterplatte Netz UL 199 / UL 230
Circuit imprimé Secteur
Printed circuit Mains

A 2 Leiterplatte Regelung UL 201 / UL 229
Circuit imprimé Réglage
Printed circuit Control

A 3 Leiterplatte A/D-Wandler UL 200
Circuit imprimé Convertisseur A/D
Printed circuit A/D-Converter

A 3 - R 2 Justierpotentiometer 100 Ohm
Potentiomètre d´ajustage
Balancing potentiometer

A 3 - S 1 Taster Istwert / Sollwert
Touche Valeur réelle /Valeur de la consigne
Key Actual value /Setpoint

A 3 - S 2 Schalter Festtemperaturen
Interrupteur Températures fixes
Switch Fixed temperatures

A 3 - V 1 LED-Anzeige Heizung
Affichage LED Chauffage
LED-Indication Heating

A 4 Leiterplatte LED-Anzeige UL 194
Circuit imprimé Affichage LED
Printed circuit LED-Indication

B 1 Temperaturfühler Pt 500
Sonde de température
Temperature probe

E 1 Heizung 1 kW
Chauffage
Heater

F 1 Überhitzungsschutz
Protection de surchauffe
Thermal cutout

F 2 Klixon

F 3 Anlaufvorrichtung
Dispositif de démarrage
Starting device

H 1 Lampe Netz
Lampe Secteur
Lamp Mains

H 2 Lampe Kühlung
Lampe Refroidissement
Lamp Cooling

M 1 Pumpenmotor
Moteur de pompe
Pump motor

M 2 Ventilator
Ventilateur
Fan

M 3 Kompressor
Compresseur
Compressor

R 1 Sollwerteinstellung 1 kOhm
Ajustage de la valeur de consigne
Setpoint adjustment

S 1 Netzschalter
Interrupteur général
Mains switch

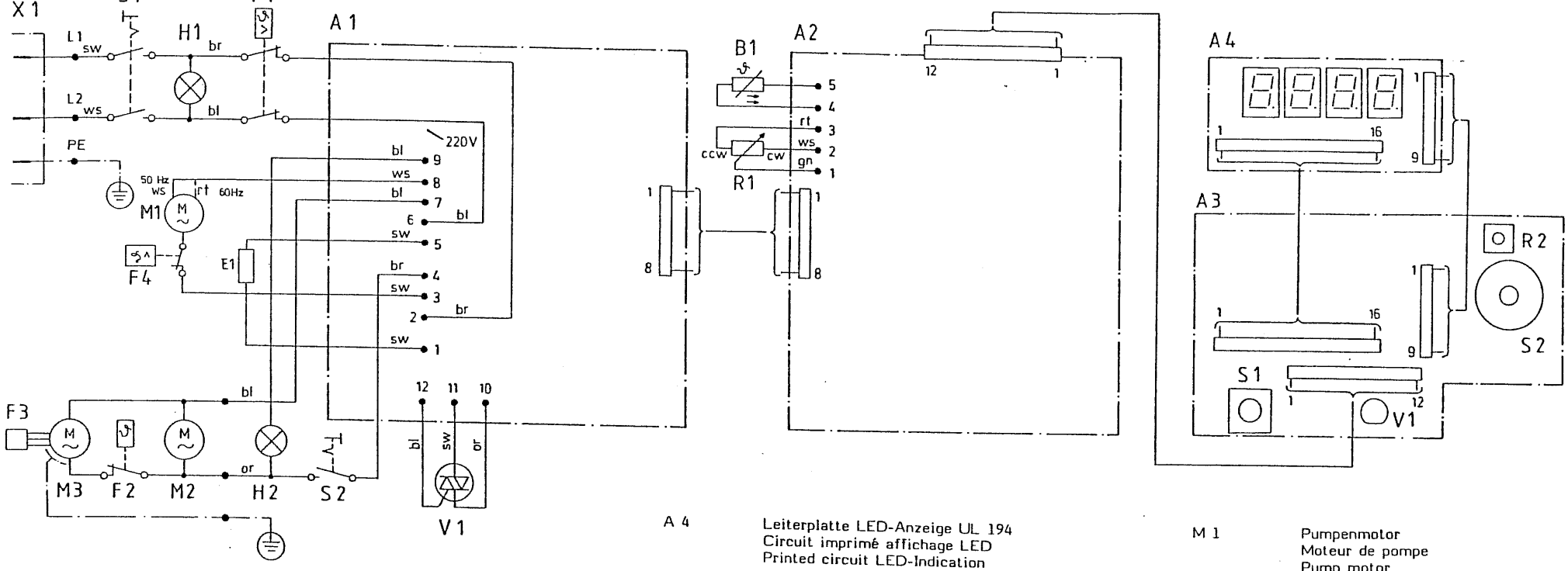
S 2 Schalter Kühlung
Interrupteur Refroidissement
Switch Cooling

V 1 Triac 15 A 700 V

X 1 Netzanschluß
Branchement secteur
Mains connection

				Datum	20.3.84		LAUDA Dr. R. Wobser GmbH & Co. KG	Schaltplan Schéma de connexions Circuit diagram	RMS 6, RMS 20, RMS 25
				Bearb.	Fr.				
				Gepr.	27.3.84 Fr.				220-240 V 50/60 Hz
Zustand	Änderung	Datum	Name	Norm.		Urspr.	Ers. f.	Ers. d.	ab/à partir/ from Serie D 50

Blatt 81



A 1	Leiterplatte Netz UL 230 Circuit imprimé secteur Printed circuit mains
A 2	Leiterplatte Regelung UL 229 Circuit imprimé réglage Printed circuit control
A 3	Leiterplatte A/D-Wandler UL 200 Circuit imprimé convertisseur A/D Printed circuit A/D-converter
A 3 - R 2	Justierpotentiometer 100 Ohm Potentiomètre d'ajustage Balancing potentiometer
A 3 - S 1	Taster Istwert/Sollwert Touche valeur réelle/valeur de la consigne Key actual value/Setpoint
A 3 - S 2	Schalter Festtemperaturen Interrupteur températures fixes Switch fixed temperature
A 3 - V 1	LED-Anzeige Heizung Affichage LED Chauffage LED-indication Heating
A 4	Leiterplatte LED-Anzeige UL 194 Circuit imprimé affichage LED Printed circuit LED-Indication
B 1	Temperaturfühler Pt 500 Sonde de température Temperature probe
E 1	Heizung 1 kW Chauffage Heater
F 1, F 4	Überhitzungsschutz Protection de surchauffe Thermal cutout
F 2	Klixon Klixon Klixon
F 3	Anlaufvorrichtung Dispositif de démarrage Starting device
H 1	Lampe Netz Lampe secteur Lamp mains
H 2	Lampe Kühlung Lampe refroidissement Lamp cooling
M 1	Pumpenmotor Moteur de pompe Pump motor
M 2	Ventilator Ventilateur Fan
M 3	Kompressor Compresseur Compressor
R 1	Sollwerteinstellung 1 kOhm Ajustage de la valeur de consigne Setpoint adjustment
S 1	Netzschalter Interrupteur général Mains switch
S 2	Schalter Kühlung Interrupteur refroidissement Switch cooling
V 1	Triac 15A/700V Triac Triac
X 1	Netzanschluß Branchement secteur Mains connection

				Datum	16.1.89		LAUDA Dr R Wobser GmbH & Co. KG	Schaltplan Schéma de connexions Circuit diagram	RMS 6 - DS
				Bearb.	Lu-Gr				
				Gepr					
Zustand	Änderung	Datum	Name	Norm.		Urspr.	Ers. f.	Ers. d.	220-240V; 50Hz 230V; 60Hz

Blatt BI